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MEMORANDUM

DATE. 28 December 1998

TO: David Bennett, WAM, U.S. EPA, Region X

FROM: Michelle Turner, Chemist, WESTON, Seattle
RM Roger McGinnis, Senior Environmental Chemist, WESTON, Seattle

SUBJECT: Validation of Inorganics Data
Laboratory Batch:K9806066
Site: Duwamish River

WORK ASSIGNMENT NO.: 46-23-0JZZ

WORK ORDER NO.. 4000-019-038-5200-00

DOC CONTROL NO · 4000-019-038-AAAK

cc Bruce Woods, RAP-WAM, U.S. EPA, Region X
Dena Hughes, Site Manager, WESTON, Seattle (memo only)
Kevin Mundell-Jackson, Database Management, WESTON, Seattle

The quality assurance review of four sediment samples, laboratory batch K9806066, collected from the Duwamish River has been completed. The sediment samples were analyzed for inorganics by Columbia Analytical Services of Kelso, Washington using EPA Methods 200, 6010, 6020, and 7000 series as required to achieve detection limit goals. The samples were numbered:

98364033	98364034	98364035	98364036

Data Qualifications

The following comments refer to the laboratory performance in meeting the quality control criteria described in the technical specifications of the laboratory subcontract The review follows the format described in the U S EPA *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA OSWER 9240.1-05-01, February 1994) modified to include specific requirements of the analytical methods.

1. Holding Times

Holding times of 28 days for mercury and six months for other metals (from date of collection to analysis) were established in the project Sampling and Analysis Plan. All samples met holding time criteria.

2. Calibration

a) Initial Calibration

Initial calibration frequencies and QC criteria were met for ICP and ICP/MS analyses.

Mass calibration for all ICP/MS internal standards was within 0.1 atomic mass unit of the true mass. ICP/MS resolution was less than 0.9 amu full width at 10 percent peak height

b) CRI/CRA Standards

Instrument calibration was verified using low level standards near the project required detection limit

c) Initial and Continuing Calibration Verification

All inductively coupled plasma (ICP) and ICP/MS results met control limits of 90 to 110 percent recovery (percent R) of the true values for both initial and continuing calibration.

Mercury cold vapor AA (CVAA) results met control limits of 80 to 120 percent recovery (percent R) for both initial and continuing calibration

3. Instrument Detection Limits

All instrument detection limits (IDL) for ICP, ICP/MS, and mercury analyses met project requirements specified in the project Sampling and Analysis Plan.

4. Blanks

a) Laboratory Method Blanks

The following analytes were detected in laboratory method blanks.

Blank ID	Analyte	Concentration	Associated Samples
K9806066-MB	Cadmium	0 08 mg/Kg	98364033 through 98364036
K9806066-MB	Nickel	0 2 mg/Kg	98364033 through 98364036
K9806066-MB	Tin	2 mg/Kg	98364033 through 98364036

Results for analytes listed above were qualified as undetected (UJ) if concentrations in associated samples were less than five times the concentration present in the blank

b) Initial Calibration and Continuing Calibration Blanks

The following elements were found in calibration blanks.

Blank ID	Analyte	Concentration	Associated Samples
CCB1	Cadmium	0 02 µg/L	98344033 through 98344036

Results for analytes are qualified as undetected (UJ) if concentrations in associated samples are less than five times the concentration present in the blank. As all sample concentrations were greater than five times the blank concentrations, no qualifiers were assigned based on blank results

c) Field Blanks

No field blank samples were associated with this laboratory batch.

5. ICP and ICP/MS Interference Check

All analytes for the interference check samples were within the control limits of 80 to 120 percent of the true values Internal standard intensities for analytes determined by ICP/MS were within ± 20 percent of the initial calibration intensity.

6. Laboratory Control Sample

Laboratory control sample recoveries were within the control limits (P-project, L-laboratory) for all analytes except the following:

Analyte	% Recovery	QC Limit
Antimony	130	80-120 (P) 24-176 (L)
Silver	79	80-120 (P) 56-144 (L)
Tin	79	80-120 (P) 43-156 (L)

Results for the above elements were qualified as estimated (J) Recoveries for Silver and Tin were below the lower project QC limit, indicating potential low bias. Undetected results for these elements are also qualified as estimated (UJ).

7. Laboratory Duplicate Sample Analysis

All relative percent differences (RPD) between analytical results were within the QC limit of 35 percent (or ± 2 times the quantitation limit for concentrations < 5 times the quantitation limit).

8. Spiked Sample Analysis

The matrix spike recoveries for the following analytes were outside QC limits:

Sample	Analyte	% Recovery	QC Limits
98364033MS	Antimony	32	75-125

In addition, as the native sample concentrations for Aluminum and Iron exceeded the spike concentration by more than 4 times, recoveries were not calculated. Data were not qualified solely on matrix spike results.

9 ICP and ICP/MS Serial Dilution

Serial dilutions were not performed for this SDG.

10. *ICP/MS Quality Control*

a) Duplicate Analysis

Duplicate analyses were not performed for this SDG.

b) Post Digest Spike Recovery

Post digest spikes were not performed for this SDG.

c) Method of Standard Additions

No samples required MSA analysis.

d) ICP/MS Internal Standards

The intensity of all internal standards was within limits of 30 to 120 percent of the initial calibration intensity for all samples

10 Field Duplicate Analysis

No field duplicates were associated with this sample delivery group.

12 Sample Analysis

A cursory raw data review was performed All laboratory deliverables were present and complete. The case narrative indicated that the MS recovery of antimony for sample

98364033 was outside the QC limits because of suspected matrix interference. The LCS recovery was within the limits, so no further corrective action was taken. The MS recoveries of aluminum and iron in this sample were not calculated as the analyte concentrations in the sample were significantly higher than the added spike concentration. Because of the high analyte levels, accurate evaluation of the spike recovery was not possible. No other problems were noted.

13 Laboratory Contact

No laboratory contact was required

Data Assessment

Upon consideration of the data qualifications noted above, the data are ACCEPTABLE for use except where flagged with data qualifiers that modify the usefulness of the individual values.

Data Qualifiers

U - The material was analyzed for, but was not detected.

UJ - The analyte was not detected. The associated quantitation limit is an estimate because quality control criteria were not met.

J - The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported were less than the CRDL or lowest calibration standard

R - Quality control indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Roy F Weston, Inc	**Service Request:**	K9806066
Project:	Duwamish River/4000-027-001-2019-38	**Date Collected:**	9/2/98
Sample Matrix:	Sediment	**Date Received:**	9/3/98

Total Metals

Sample Name	98364033	Units	mg/Kg (ppm)
Lab Code	K9806066-001	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	21400	
Antimony	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	ND	10UJ
Arsenic	EPA 3050B	200 8	0 5	0 1	10	10/9/98	10/20/98	14 2	
Barium	EPA 3050B	6010B	1	0 6	2	10/9/98	10/20/98	93	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	10/9/98	10/20/98	0 47	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	0 6	
Calcium	EPA 3050B	6010B	10	3	2	10/9/98	10/20/98	6750	
Chromium	EPA 3050B	6010B	2	0 7	2	10/9/98	10/20/98	35	
Cobalt	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	11	
Copper	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	78	
Iron	EPA 3050B	6010B	4	4	2	10/9/98	10/20/98	33300	
Lead	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	69 9	
Magnesium	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	8570	
Manganese	EPA 3050B	6010B	1	0 4	2	10/9/98	10/20/98	368	
Mercury	7471A	7471A	0 05	0 02	1	9/15/98	9/18/98	0 27	
Nickel	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	22 8	
Potassium	EPA 3050B	6010B	400	400	2	10/9/98	10/20/98	2800	
Selenium	EPA 3050B	200 8	1	0 3	10	10/9/98	10/20/98	5	
Silver	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	0 48	J
Sodium	EPA 3050B	6010B	20	20	2	10/9/98	10/20/98	13100	
Thallium	EPA 3050B	200 8	0 02	0 006	10	10/9/98	10/20/98	0 14	
Tin	EPA 3050B	200 8	2	0 05	10	10/9/98	10/20/98	5	UJ
Vanadium	EPA 3050B	6010B	2	0 6	2	10/9/98	10/20/98	70	
Zinc	EPA 3050B	6010B	2	0 8	2	10/9/98	10/20/98	168	

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806066
Date Collected: 9/2/98
Date Received: 9/3/98

Total Metals

Sample Name 98364034
Lab Code K9806066-002
Test Notes

Units mg/Kg (ppm)
Basis Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	9780	
Antimony	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	ND 10UJ	
Arsenic	EPA 3050B	200 8	0 5	0 1	10	10/9/98	10/20/98	6 8	
Barium	EPA 3050B	6010B	1	0 6	2	10/9/98	10/20/98	42	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	10/9/98	10/20/98	0 28	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	0 3UJ	
Calcium	EPA 3050B	6010B	10	3	2	10/9/98	10/20/98	3550	
Chromium	EPA 3050B	6010B	2	0 7	2	10/9/98	10/20/98	17	
Cobalt	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	7	
Copper	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	30	
Iron	EPA 3050B	6010B	4	4	2	10/9/98	10/20/98	18100	
Lead	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	37 6	
Magnesium	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	4100	
Manganese	EPA 3050B	6010B	1	0 4	2	10/9/98	10/20/98	176	
Mercury	7471A	7471A	0 05	0 02	1	9/15/98	9/18/98	0 05	
Nickel	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	12 6	
Potassium	EPA 3050B	6010B	400	400	2	10/9/98	10/20/98	1200	
Selenium	EPA 3050B	200 8	1	0 3	10	10/9/98	10/20/98	3	
Silver	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	0 19 J	
Sodium	EPA 3050B	6010B	20	20	2	10/9/98	10/20/98	5450	
Thallium	EPA 3050B	200 8	0 02	0 006	10	10/9/98	10/20/98	0 11	
Tin	EPA 3050B	200 8	2	0 05	10	10/9/98	10/20/98	3 10UJ	
Vanadium	EPA 3050B	6010B	2	0 6	2	10/9/98	10/20/98	47	
Zinc	EPA 3050B	6010B	2	0 8	2	10/9/98	10/20/98	61	

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Roy F Weston, Inc	**Service Request:**	K9806066
Project:	Duwamish River/4000-027-001-2019-38	**Date Collected:**	9/2/98
Sample Matrix:	Sediment	**Date Received:**	9/3/98

Total Metals

Sample Name	98364035	Units	mg/Kg (ppm)
Lab Code	K9806066-003	Basis	Dry
Test Notes			

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	22700	
Antimony	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	6	(J)
Arsenic	EPA 3050B	200 8	0 5	0 1	10	10/9/98	10/20/98	14 6	
Barium	EPA 3050B	6010B	1	0 6	2	10/9/98	10/20/98	99	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	10/9/98	10/20/98	0 51	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	0 63	
Calcium	EPA 3050B	6010B	10	3	2	10/9/98	10/20/98	9220	
Chromium	EPA 3050B	6010B	2	0 7	2	10/9/98	10/20/98	36	
Cobalt	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	11	
Copper	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	90	
Iron	EPA 3050B	6010B	4	4	2	10/9/98	10/20/98	34700	
Lead	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	70 1	
Magnesium	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	9230	
Manganese	EPA 3050B	6010B	1	0 4	2	10/9/98	10/20/98	372	
Mercury	7471A	7471A	0 05	0 02	1	9/15/98	9/18/98	0 27	
Nickel	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	25 1	
Potassium	EPA 3050B	6010B	400	400	2	10/9/98	10/20/98	3200	
Selenium	EPA 3050B	200 8	1	0 3	10	10/9/98	10/20/98	5	
Silver	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	0 52 J	
Sodium	EPA 3050B	6010B	20	20	2	10/9/98	10/20/98	13400	
Thallium	EPA 3050B	200 8	0 02	0 006	10	10/9/98	10/20/98	0 15	
Tin	EPA 3050B	200 8	2	0 05	10	10/9/98	10/20/98	6 UJ	
Vanadium	EPA 3050B	6010B	2	0 6	2	10/9/98	10/20/98	74	
Zinc	EPA 3050B	6010B	2	0 8	2	10/9/98	10/20/98	156	

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: Roy F Weston, Inc
Project: Duwamish River/4000-027-001-2019-38
Sample Matrix: Sediment

Service Request: K9806066
Date Collected: 9/2/98
Date Received: 9/3/98

Total Metals

Sample Name: 98364036
Lab Code: K9806066-004
Test Notes

Units: mg/Kg (ppm)
Basis: Dry

Analyte	Prep Method	Analysis Method	MRL	MDL	Dilution Factor	Date Extracted	Date Analyzed	Result	Result Notes
Aluminum	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	18600	
Antimony	EPA 3050B	6010B	10	5	2	10/9/98	10/20/98	ND	10UJ
Arsenic	EPA 3050B	200 8	0 5	0 1	10	10/9/98	10/20/98	9 9	
Barium	EPA 3050B	6010B	1	0 6	2	10/9/98	10/20/98	62	
Beryllium	EPA 3050B	200 8	0 02	0 02	10	10/9/98	10/20/98	0 43	
Cadmium	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	0 4	
Calcium	EPA 3050B	6010B	10	3	2	10/9/98	10/20/98	5020	
Chromium	EPA 3050B	6010B	2	0 7	2	10/9/98	10/20/98	26	
Cobalt	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	9	
Copper	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	44	
Iron	EPA 3050B	6010B	4	4	2	10/9/98	10/20/98	27300	
Lead	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	21 0	
Magnesium	EPA 3050B	6010B	2	2	2	10/9/98	10/20/98	7270	
Manganese	EPA 3050B	6010B	1	0 4	2	10/9/98	10/20/98	282	
Mercury	7471A	7471A	0 05	0 02	1	9/15/98	9/18/98	0 17	
Nickel	EPA 3050B	200 8	0 2	0 02	10	10/9/98	10/20/98	18 6	
Potassium	EPA 3050B	6010B	400	400	2	10/9/98	10/20/98	2400	
Selenium	EPA 3050B	200 8	1	0 3	10	10/9/98	10/20/98	4	
Silver	EPA 3050B	200 8	0 02	0 004	10	10/9/98	10/20/98	0 21	J
Sodium	EPA 3050B	6010B	20	20	2	10/9/98	10/20/98	12400	
Thallium	EPA 3050B	200 8	0 02	0 006	10	10/9/98	10/20/98	0 11	
Tin	EPA 3050B	200 8	2	0 05	10	10/9/98	10/20/98	3	UJ
Vanadium	EPA 3050B	6010B	2	0 6	2	10/9/98	10/20/98	60	
Zinc	EPA 3050B	6010B	2	0 8	2	10/9/98	10/20/98	108	

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